

Additional Questions for the Record
Janet McCabe and Paul Hemmersbaugh Testimony, September 22, 2016

Combined EPA and NHTSA Responses

The Honorable Michael C. Burgess M.D.

1. In your written statement and oral testimony, you mentioned how the "footprint" standards preserve consumer choice and individualize the standards. However, automakers will be required to make significant improvements to the fuel economy of all vehicles, irrespective of footprint. This will impact the types of engines available within a particular vehicle class, the materials used to construct the vehicle (e.g. aluminum and other lighter-weight material) and the fuel-saving technology that will come with the vehicle (e.g. start-stop technology).
 - A. Please explain how NHTSA and EPA assessed the extent to which consumer choice will be impacted with respect to the performance capabilities and vehicle features within a given vehicle footprint.
 - A. Is there anything besides the "footprint standards" that preserve consumer choice?
 - B. For example, what (if anything) did EPA and NHTSA do to ensure that consumers will still be able to purchase high-performance vehicles with large towing capacity, should they or their small business need to do so?
 - C. Similarly, were the agencies concerned that consumers may be forced to purchase vehicles with certain fuel saving technologies that don't fit their needs, and if so, how did they address that concern? Have you studied whether entry point vehicles will be disproportionately impacted?

EPA Response

In designing the 2012-2025 GHG standards, in coordination with NHTSA, EPA carefully considered the impact the standards can have on vehicle utility and consumer choice so that when automotive companies comply with the standards, they have the ability to maintain vehicle utility and consumer choice. EPA and NHTSA decided to use vehicle "footprint" as the attribute to determine the GHG standards for a given automotive manufacturer's fleet (the standard being the production-weighted average of the footprint-based targets for each vehicle produced). The standards vary by footprint such that larger vehicles have higher GHG and lower fuel economy targets than smaller vehicles. The program is "self-adjusting" in that if a manufacturer sells a larger mix of vehicles, then its overall fleet wide standard will be less stringent than if it sells a smaller mix of vehicles.

In addition to footprint-based standards, EPA considered many other provisions of the rule, and

the data and analysis by which the standards were developed, to work together to preserve consumer choice and vehicle affordability. These provisions include:

- The establishment of separate passenger car footprint-based standards and light-truck footprint-based standards;
- The establishment of performance-based standards (*i.e.*, not mandating use of any particular technology) that allow the auto companies to decide what technologies work best for their customers to achieve the standards;
- The establishment of a GHG emissions averaging, banking, and trading program;
- Using analytical methods and data to ensure the standards themselves are predicated on no loss in vehicle performance;
- Flexible credit generation provisions including generation of CO₂ credits from improvements in air conditioning systems and off-cycle credits, and the trading of credits for over-compliance with nitrous oxide, methane, and CO₂ credits;
- The specific shape of the passenger car and light-truck curves, which were carefully designed to represent approximately equal levels of technical challenge for each individual footprint value along the footprint standard curves;
- A change to the shape of the light-truck footprint standard curve beginning in model year 2017 to more accurately recognize the unique characteristics of high performance pickup trucks, including the need for those vehicles to perform significant towing and maintain payload capabilities;
- Providing very long lead-times for the development and deployment of technologies, up to 13 years for the most stringent 2025 standards, which with the use of the emissions averaging, banking and trading program can be extended to 18 years if needed.

These program elements and considerations in the establishment of the stringency of the 2012-2025 GHG standards provide the automotive companies with a wide range of tools to ensure that they can continue to design and sell the types of products with the utility and capability that their customers want.

With regard to consumer choice within a given vehicle footprint, a manufacturer is not required to meet the exact footprint-based CO₂/fuel economy target of any particular vehicle; rather, the manufacturer has flexibility to meet the standards on a fleet-wide average basis. Thus, within a given footprint, a manufacturer may choose to produce vehicles that have GHG emissions that are higher or lower than the given footprint-based target, and the program provides a wide range of flexibilities to achieve compliance, such as averaging and opportunities for credit transfers and credit trading. Similarly, with regard to high-performance or large towing capacity, a manufacturer is not obligated to meet the exact footprint-based CO₂/fuel economy target for those particular vehicles, but has the flexibility to meet the standards on a fleet-wide average basis. Based on EPA's reports of manufacturer's performance in meeting the standards so far, for the first four years of the program (model years 2012-2015), the industry overall has outperformed the standards each year, and this has occurred during a time when vehicles sales have also increased in each of these years. This is an indication that it is possible for consumers to purchase the vehicles that meet their needs while achieving significant GHG reductions/fuel economy improvements, and that automakers

have found ways to satisfy their customers' needs in ways that still enable them to not only meet, but beat, the standards.

With respect to the last question regarding entry-point (lower-priced) vehicles and disproportionate impacts, EPA carefully considered the issue of vehicle affordability and impacts on lower-income consumers, both in the 2012 final rule establishing the 2017-2025 standards, and in the Draft Technical Assessment Report (TAR) published this past July. In the Draft TAR, the agencies discussed this issue (see Chapter 6.5.4), and found that in model year 2015 nearly the same number of low-priced vehicle models (that is, those with a manufacturer's suggested retail price of less than \$15,000) were sold as in 2001-2009 annually. Thus, to date, it appears that manufacturers have been able to preserve the number of offerings in this segment, likely due at least in part to all of the program design elements and flexibilities available to automotive manufacturers as described above. The agencies further found that, while prices of these entry-point vehicles have risen somewhat from 2001-2015, the content of some vehicles in this segment has also increased (e.g., Bluetooth, audio controls), which likely has contributed to any price increases.

NHTSA Response

RESPONSE to 1.A:

NHTSA's Corporate Average Fuel Economy (CAFE) standards allow manufacturers to choose where and how they make improvements. Nothing in the program prevents manufacturers from producing some vehicles with fuel economy that falls well below their footprint target, as long as the difference is made up by another vehicle or vehicles above their targets.

When NHTSA sets standards, it accounts for consumer choice within particular segments by considering technology in vehicle classes only where it is appropriate to do so. For example, high compression ratio engines, plug-in hybrids, and some "strong" hybrid technologies may not be practical for full-size pickups due to the ways they are used by consumers. In addition, among other things, NHTSA's model incorporates phase-in caps tailored to assumptions about consumer purchasing behavior, and it endeavors to keep performance constant as technology is applied. NHTSA's modeling also carefully considers the anticipated pace of vehicle redesigns, which is typically more widely-spaced for full-size pickups and some performance cars than for many passenger cars. NHTSA seeks to ensure that the CAFE modeling is as realistic as possible. By modeling a compliance path for industry that incorporates factors like those mentioned above, the setting of maximum feasible standards is unlikely to require manufacturers to change the vehicles they sell in ways that consumers will reject. Manufacturers have substantial flexibility to decide where and how to make their improvements.

RESPONSE to 1.B:

Unlike vehicle safety standards or EPA exhaust emissions standards, CAFE standards apply to average fuel economy levels, not per-vehicle fuel economy levels. In addition, the Energy

Independence and Security Act of 2007 (EISA) expanded flexibilities already available under the Energy Policy and Conservation Act of 1975 (EPCA), allowing CAFE credits to be transferred between fleets and traded between manufacturers. The long-standing averaging-based approach provided by EPCA and the expanded flexibilities introduced by EISA together allow manufacturers to balance compliance obligations and provide a wide range of vehicles while ensuring that their fleet, on average, complies with the program, thereby preserving consumer choice. NHTSA sets standards accounting for a wide range of vehicles offered by manufacturers with an understanding that not all technologies will be uniformly adopted by consumers.

RESPONSE to 1.C:

NHTSA's CAFE standards are based on vehicle footprint, resulting in larger vehicles having lower fuel economy targets than smaller vehicles. Lower footprint targets for larger, high-performance vehicles acknowledge that fuel economy improvements can be made without requiring technology that would reduce the utility of those vehicles. Further, the agencies selected the truck curve (e.g., steeper curve slopes and longer cut points) so that manufacturers should be better able to avoid downgrading the performance or utility of the largest vehicles while still having an incentive to improve their fuel economy. Additionally, NHTSA's analysis and methodology mentioned above helps to account for consumer preferences for vehicle attributes other than fuel economy. Regarding vehicles with large towing (and/or payload) capacity, such as may be needed by some small businesses, heavy-duty pickups and vans are regulated separately under standards defined in terms of a "work factor," which explicitly accounts for vehicle characteristics such as vehicle payload, towing capacity, and four-wheel drive.

RESPONSE to 1.D:

NHTSA's analysis recognizes that not all fuel economy technologies can or will be incorporated uniformly across manufacturer fleets. Manufacturers can choose where and how to improve the average fuel economy of their fleets based on the needs of consumers. Manufacturers may choose to concentrate their efforts in certain segments or to spread improvements across greater portions of their fleets. NHTSA does not dictate any specific compliance path. As a result, consumers will be able to buy any vehicle they choose that fits their needs. Affordability of entry point vehicles is a topic that NHTSA will look at more closely in the upcoming notice of proposed rulemaking (NPRM) as part of our assessment of economic practicability, which is one of the factors that the Agency must consider in setting maximum feasible CAFE standards.

2. **[Question to EPA only]** In light of the fact that a manufacturer's fleet-average GHG emissions are limited by these standards, does the California ZEV mandate achieve any additional benefit in terms of GHG reductions from the light duty fleet?

EPA Response

While the fleet-average GHG emissions standards establish minimum standards, they do not limit the ability of manufacturers to achieve further reductions, and any manufacturer that does

will generate credits that can be used or traded. The EPA GHG standards are performance standards, and do not require any specific technology. That is not the case with the California ZEV mandate, which thus provides an incentive for automotive companies to invest in more advanced technologies. EPA's assessment for the Draft TAR indicates that were it not for the California ZEV program, most auto companies would not produce as many all electric and plug-in hybrid electric vehicles in the 2025 time frame. California adopted its ZEV program to address multiple pollutants, including GHGs, and the reductions in pollution from ZEVs in California help address the significant air quality challenges in that state. ZEVs sold in California and other states will help a manufacturer to meet (or exceed) the EPA GHG standards.

3. In your opinion, are advances in conventional internal combustion engine technology (i.e., non-hybrid) sufficient by themselves to achieve the current standards for model year 2025? If not, could you please provide your estimates for how much of each of the following technologies (as defined in the TAR) will be required to achieve the current standards for model year 2025: (a) mild hybrid; (b) full hybrid; (c) plug-in hybrid electric vehicle; and (d) electric vehicle.

Joint Response

The agencies show in the Draft TAR that the 2022-2025 standards can be achieved largely through the use of advanced gasoline vehicle technologies with modest penetrations of strong hybrids and very low penetrations of full electrification (like plug-in hybrid electric vehicles, and all electric vehicles). The agencies' analyses in the Draft TAR present, respectively, different feasible, cost-effective compliance paths for manufacturers. Since the standards are performance-based, each manufacturer is free to choose the suite of technologies that it believes are best for its vehicles to meet the standards. In other words, these pathways are not an assumption of the minimum amounts of these technologies manufacturers will need to deploy to meet the standards.

Additional EPA Response

In EPA's estimates of a low-cost pathway by which a manufacturer could achieve the MY2025 standards, we projected fleet penetrations of about 18% mild hybrids, less than 3 percent full hybrids, less than 2 percent plug-in hybrid electric vehicles, and less than 3 percent electric vehicles.

Additional NHTSA Response

As Table ES-3 of the Draft Technical Assessment Report (TAR) shows, based on the assumptions used at that time, NHTSA's primary analysis for the TAR found that fleetwide compliance with the augural MY 2025 CAFE levels could generally be achieved with 14% mild hybrids; 14% full hybrids; less than 1% plug-in hybrid electric vehicles; and less than 2% electric vehicles. However, manufacturers may rely on different compliance strategies than those assumed by NHTSA in the TAR

4. According to Table ES-3 of the TAR, EPA's compliance pathway for meeting the MY2025 GHG standards envisions that 44% of vehicles would use higher compression ratio, naturally aspirated gasoline engines. If a manufacturer does not have that type of engine in any of its vehicles today, what steps would it have to take in order to integrate that type of engine in its product line, and how long would it take for it to reach a 44% penetration rate?

EPA Response

The use of higher compression ratio, naturally aspirated gasoline engines (Atkinson cycle engines) is just one technology among the many suites of potential technology pathways to compliance. EPA analyzed nine additional potential technology pathways by which the industry could comply with the 2022-2025 standards, including a pathway with only a 10% penetration of higher compression ratio, naturally aspirated gasoline engines (see Chapter 12.1.2 of the Draft TAR).

The steps required to implement an Atkinson cycle engine are relatively modest compared to implementing some of the other engine technologies being developed and implemented. The technology requires an intake valve cam phaser with a high range of control authority and increased geometric compression ratio (see the Draft TAR, Chapter 5.2.2.9, which describes the technology and provides examples of current implementations). The requisite cam phaser hardware is readily available to any manufacturer, and the technology is not restricted by patent protections. As discussed in the Draft TAR, it is EPA's assessment that this technology can be incorporated by any manufacturer and that there is sufficient time between now and the model year 2022 to 2025 that this technology can represent a high penetration rate of a company's products. We note that EPA's vehicle emissions rules have always incorporated the lead time necessary for the industry to comply. In this case, the standards were set in 2012 with an especially long lead time – more than 10 years – and the vehicle manufacturers have been developing a range of technologies for several years, as discussed in detail in the Draft TAR.

Several manufacturers – including Mazda, Hyundai, and Toyota -- are implementing forms of Atkinson cycle engine technology today, and other automakers have told EPA confidentially that they are planning to follow this path for some of their engines.

It is important to note that EPA's projected technology penetrations are meant to illustrate one of many possible technology pathways to achieve compliance with the MY2025 GHG standards. The rules do not mandate the use of any particular form of technology. Put another way, the standards are performance-based and thus manufacturers are free to select among the suite of technologies they best believe is right for their vehicles to achieve compliance. As we've seen in recent years with the rapid advances in a wide range of GHG-reduction technologies, ongoing innovation can be expected to result in further improvements to existing technologies and the emergence of others.

NHTSA Response

This question is specifically about EPA's analysis, and NHTSA defers to EPA to answer for its analysis. For NHTSA's analysis, NHTSA assumes that manufacturers that have already taken steps in other directions (in particular, toward downsized turbocharged engines) would continue in those directions rather than pursuing high compression ratio engines.

5. In the TAR, the EPA states that in its modeling, "the California Zero Emission Vehicles (ZEV) program is considered in the reference case fleet; therefore, 3.5% of the fleet is projected to be full EV or PHEV in the 2022-2025 timeframe due to the ZEV program and the adoption of that program by nine additional states." Since a significant portion of the required GHG reductions will be met through manufacturing electric-drive vehicles for the ZEV mandate, shouldn't EPA have considered those costs in its assessment of the costs of the regulation? If EPA had considered the costs of producing electric-drive vehicles, what impact would that have had on the cost estimates in the TAR?

EPA Response

The California ZEV program is an existing state requirement that has been adopted by California, as well as several other states across the country – it is not a federal program. Therefore, consistent with guidance issued by the Office of Management and Budget, EPA included vehicles that are needed to comply with the ZEV program as part of our reference fleet in assessing the MY2022-2025 GHG standards (See OMB Circular A-4, Section E.2, "Developing a Baseline"). The Draft TAR does not include an assessment of the benefits or the costs of the ZEV program in the assessment of 2022-2025 National Program standards. However, any ZEV vehicles sold in California and other states will help a manufacturer in meeting the EPA GHG standards.

6. As was noted in the hearing, one of the goals of the so-called "One National Program" is to enable automakers to build a single fleet of vehicles that could be sold anywhere in the country. Can EPA/NHTSA please explain whether the modeling that each individually performed for the Draft TAR results in a single fleet for each manufacturer that simultaneously complies with the EPA greenhouse gas regulation, the NHTSA fuel economy regulation, and the State of California's zero emission vehicle regulation?

EPA Response

EPA's detailed modeling presented in the Draft TAR shows that each manufacturer has a compliance pathway for its projected MY 2025 GHG standards (see, for example, Table 12-4 and Tables 12-29 through 12-40 of the Draft TAR). In addition, EPA's assessment incorporates projected compliance with the ZEV program through our reference case (i.e. the fleet as it would exist in MYs 2022-2025 without complying with the GHG emission standards for those model years), as described in our response to Questions 2 and 5, and any ZEV-

compliant vehicles do count towards the manufacturers' GHG compliance. EPA did not explicitly model the CAFE program.

NHTSA Response

EPCA, as amended by EISA in 2007, establishes specific and clear direction regarding many CAFE provisions (e.g., attribute-based standards expressed as mathematical functions, separate standards for cars and trucks, separate compliance for domestic and imported passenger car fleets, caps on credit transfers and trades), and requires NHTSA to set each CAFE standard separately at the maximum feasible level in each model year. The Clean Air Act provides no corresponding direction.

Given these different statutory frameworks, NHTSA and EPA have attempted to harmonize requirements from model year 2012 forward. While manufacturers may choose to take advantage of EPA-specific provisions (e.g., credit for reducing emissions of high global warming potential refrigerants), the agencies have designed the standards so that it is possible for a fleet that complies with CAFE standards to comply also with greenhouse gas (GHG) standards. If manufacturers are also complying with the zero emission vehicle (ZEV) standard, the vehicles that they build in order to meet that standard would be counted toward CAFE compliance as part of their overall U.S. fleet. That said, NHTSA models compliance in accordance with its own statutory authority, and not with EPA's GHG standards or with CARB's ZEV program.

7. **[Question to EPA only]** You describe your next step in the midterm evaluation process as a proposed determination. First, when do you expect this step to occur? Second, when do you anticipate responding to public comment on the Draft TAR? Lastly, can you assure this Committee that the EPA isn't attempting to issue a proposed determination this year or before the next Administration is sworn into office?

EPA Response

On November 30, 2016, Administrator McCarthy signed the Proposed Determination referred to in this question, and has opened a 30-day public comment period. The Proposed Determination is based on years of extensive analysis that demonstrates that automakers are well on track to meeting the model year 2022-2025 standards through a wide range of technology pathways that are attractive to consumers.

As part of the Proposed Determination, EPA has fully considered and responded to the public comments we received on the Draft TAR this year as well as updated information.

EPA's detailed technical analyses are laid out in a comprehensive Technical Support Document. These analyses have led to a very strong proposed technical conclusion that the standards established in 2012 for the 2022-2025 model years continue to be appropriate, without change. EPA will consider any additional data and information we receive during this

additional public comment period, as part of the Administrator's Final Determination.

The Administrator views the factual record as clear and extensive, benefitting from significant public input from the automotive industry and many other stakeholders. At this point, the Administrator has a strong record that allows her to move forward with her proposed determination without delay. Given the benefits of regulatory certainty and the long lead time needed in the automobile manufacturing business, the Administrator will expeditiously consider all comments and will reach a Final Determination as the facts warrant.

Finally, it is important to recognize that the Proposed Determination is not a standard-setting rule; in fact, it is not a rule at all, and proposes absolutely no changes to the existing standards. Rather, it is a comprehensive reassessment of the state of technology and technology costs in the auto manufacturing sector and of trends that can be clearly identified today, and how this state of affairs relates to the effectiveness and appropriateness of the current standards

5. [Question to NHTSA only] As was noted in the hearing, one of the goals of the so-called "One National Program" is to enable automakers to build a single fleet of vehicles that could be sold anywhere in the country. Can NHTSA please explain whether the modeling that it individually performed for the Draft TAR results in a single fleet for each manufacturer that simultaneously complies with the EPA greenhouse gas regulation, the NHTSA fuel economy regulation, and the State of California's zero emission vehicle regulation?

NHTSA Response

EPCA, as amended by EISA in 2007, establishes specific and clear direction regarding many CAFE provisions (e.g., attribute-based standards expressed as mathematical functions, separate standards for cars and trucks, separate compliance for domestic and imported passenger car fleets, caps on credit transfers and trades), and requires NHTSA to set each CAFE standard separately at the maximum feasible level in each model year. The Clean Air Act provides no corresponding direction.

Given these different statutory frameworks, NHTSA and EPA have attempted to harmonize requirements from model year 2012 forward. While manufacturers may choose to take advantage of EPA-specific provisions (e.g., credit for reducing emissions of high global warming potential refrigerants), the Agencies have designed the standards so that it is possible for a fleet that complies with CAFE standards to comply also with greenhouse gas (GHG) standards. If manufacturers are also complying with the zero emission vehicle (ZEV) standard, the vehicles that they build in order to meet that standard would be counted toward CAFE compliance as part of their overall U.S. fleet. That said, NHTSA models compliance in accordance with its own statutory authority, and not with EPA's GHG standards or with CARB's ZEV program.

8. [Question to EPA only] Your agency modeled that the total plug-in electric vehicle market-share for 2025 would need to be over 4% in the United States to meet the State of California zero emission vehicle program requirements, approximately 6.5 times higher than its state in 2015 (0.66%, hybridcars.com). What enabling complimentary policies

from the federal government do you see as necessary to bring this modeled increase to fruition?

EPA Response

The Draft TAR analysis projects about 4% electric vehicles (EV) and plug-in hybrid electric vehicles (PHEV) in the 2025 fleet. Of this 4%, only about 1% was the increment driven by the GHG standards. The remaining vehicles were included in our reference fleet – either EV/PHEVs already in the MY2014 baseline fleet projected out to 2025 (~190,000 vehicles), or required by the California ZEV program (~420,000 vehicles). See Tables 4.27 and 4.28 of the Draft TAR. EPA is aware that California and the other states that have adopted the ZEV program have put in place many complementary policies to support the growth of EV and PHEVs in their states to support their adoption of the ZEV program.

EPA in general is supportive of and engaged in well-designed complementary federal government policies that will support the growth of the electrified vehicle market, as these technologies will likely be needed in order to meet the longer-term need to address GHG emissions from the transportation sector. EPA does not regard such programs as critical for the very small number of these vehicles (about 1%) projected in the Draft TAR analysis for compliance with the 2025 GHG standards.

10. [Question to NHTSA only] In your opening statement you described the levels of strong hybrids that NHTSA models as being necessary for compliance in 2025 as "modest". Can you please explain your reasoning given that the level of strong hybrids modeled was 14% (Draft TAR at ES- I 0), approximately five times the present level of the market (approximately 3%)?

NHTSA Response

The standards examined are for model year (MY) 2025. NHTSA believes that 14% is a modest level of strong hybrids for a model year that is almost a decade in the future. It bears repeating that it is up to manufacturers to determine how they choose to comply.

9. Both EPA and NHTSA modeled an average vehicle cost increase of \$680 to \$1,620 for manufacturers to bring vehicles into compliance with the 2025 regulations relative to the 2021 regulations. What is your total estimated cost increase for model year 2025 vehicles relative to 2016 model year vehicles for all regulations under your purview, including the 2017-2021 greenhouse gas and fuel economy regulations, "Tier 3" tailpipe emission regulation, and all applicable and reasonably anticipated safety regulations? Given these anticipated increases in vehicle price, what do you estimate the loss in vehicle sales related to these regulations to be? What are the resulting automotive and related industry job losses anticipated?

EPA Response

In the Draft TAR, EPA estimated an average per-vehicle cost of \$1,565 for the industry to go from the MY2014 baseline fleet level to the MY2025 standards (see Table 12.44 of the Draft TAR). Since the Tier 3 tailpipe criteria pollutant emissions standards are already in effect, these regulations, as well as existing safety regulations, were treated as part of our reference fleet analysis. The Tier 3 light-duty vehicle emissions and fuel standards final rule in 2014 estimated that the cost of that program would be \$72 per vehicle by 2025, when the program is fully phased in.

As explained in the Draft TAR, to date consumer response to vehicles subject to the GHG standards is positive. Our analysis in the Draft TAR also continues to project that the fuel savings over time will far exceed the up-front vehicle costs, which we believe should mitigate any potential impacts on vehicle sales. While there may be some net effect of the standards on jobs (for example, jobs spurred by increased auto industry and supplier expenditures on technologies to meet the standards or jobs lost because higher priced vehicles may lead to reduced sales) we believe any such effects are likely to be small compared to the large effects of the macroeconomic forces shaping the auto industry today.

NHTSA Response

Tier 3 is an EPA regulation, and not under NHTSA's jurisdiction, so NHTSA does not account for the costs of Tier 3 compliance in NHTSA rulemakings. Safety standards and fuel economy regulations can increase the cost of producing vehicles by requiring manufacturers and suppliers to internalize the otherwise-external costs to society of vehicle crashes, fuel use, and environmental impacts that safety standards and fuel economy regulations could prevent or mitigate. However, many long-term economic benefits still exist for consumers that are not accounted for in vehicle price, such as reduced fuel costs over the lifetime of a vehicle resulting from fuel economy improvements. Further, NHTSA does not believe that sales and job losses are inevitable as a result of increases in vehicle production costs. Also, given that manufacturers use safety and fuel economy as selling points, manufacturers would reasonably be expected to construct sales campaigns that explain to consumers how the benefits of these improvements outweigh any cost increases that manufacturers choose to pass on to consumers.

10. Both EPA and NHTSA developed two different analyses of the technologies required to meet the 2025 greenhouse gas and fuel economy regulations. You purport that these separate analyses show how manufacturers have many paths which could be chosen for compliance. Please explain how two completely different technology pathways both result in the "lowest" cost of compliance for a manufacturer and the American consumer?

Joint Response

The GHG and CAFE standards are performance standards, and manufacturers are free to choose exactly how they wish to comply. The agencies know that manufacturers will not choose

exactly the paths that our respective analyses reflect. The GHG and CAFE analyses shown in the Executive Summary for the Draft TAR are just two of many potential pathways for meeting the future standards. For example, in Section 12.1.2 EPA shows 9 other technology pathways by which the industry could comply with the MY2022-2025 standards. The separate analyses make our results more robust and credible.

The agencies' independent analyses complement one another and reach similar conclusions, including that advanced gasoline vehicle technologies will continue to be the predominant compliance choice, with modest levels of strong hybridization and very low levels of full electrification (plug-in vehicles) needed to meet the standards. It is important to note that the agencies' projected technology penetrations are meant to illustrate several of the many possible cost-effective technology pathways to achieve compliance with the MY2022-2025 GHG standards. The standards are performance-based and thus manufacturers are free to select among the suite of technologies they believe is best for their vehicles to achieve compliance.

Both the NHTSA and EPA models are based on cost optimization, and some of the differences in analysis are attributed to differences in each agency's modeling inputs or methods, many of which are due to differences in the agencies' respective statutes. As one example, only NHTSA's analysis considers EPCA/EISA's provisions regarding civil penalties and limitations on credit transfers. Again, the Agencies recognize that manufacturers may not choose exactly the path that we have modeled. Since CAFE and GHG standards are performance standards and not technology mandates, manufacturers are free to choose which technologies to apply to which vehicles in order to meet consumer demand and the standards at the same time, i.e., they have many potential pathways.

11. Auto manufacturers claim to have identified a number of technical issues with the technology benefit modeling described by the Draft TAR. What is your plan to address these concerns? Have your agencies verified these models against actual vehicles other than those the models were calibrated to directly? If so, what were the results?

EPA Response

EPA appreciates the public comments regarding our modeling in the Draft TAR; we have carefully considered the public comments on our technology analysis, and have updated our assessment in several areas in response to comments, as described in detail in the Proposed Determination. With respect to the modeling performed for the Draft TAR, EPA verified our models with actual vehicles and we use actual engine and transmission maps along with actual measured vehicle data in our modeling. This is described on our vehicle simulation model website (<https://www3.epa.gov/otaq/climate/alpha.htm>) and detailed in 16 recent peer-reviewed technical papers published by the Society of Automotive Engineers (SAE) describing our vehicle, engine, & transmission benchmarking, and the development and use of EPA's full vehicle simulation model. As summarized in SAE paper 2016-01-0910, EPA has tested over 25 different types of conventional and hybrid vehicles/engines across a wide range of powertrains and segments. The vehicles/engines were chosen based on our need to evaluate key technologies like naturally aspirated and boosted (turbocharged) I4/I6/V6 engines, using 5, 6 and

8+ speed automatic and dual-clutch transmissions, as well as continuously variable transmissions.

NHTSA Response

NHTSA is currently reviewing and will address comments regarding inputs (e.g., “engine maps” and transmission characteristics) to the full vehicle simulation work used to estimate the extent to which various combinations of fuel-saving technologies could reduce fuel consumption for different types of vehicles.

12. Fuel prices have changed significantly since 2012 when the 2022-2025 rules were first established. Can you explain why these changes in fuel prices have had minimal impact on your modeling results?

Joint Response

These changes in fuel prices are fully reflected in the Draft TAR analysis, and influence the initial conclusions stated in the Draft TAR. In the Draft TAR, the agencies used available data from the Energy Information Administration’s Annual Energy Outlook (AEO) 2015. The AEO2016 Reference case was first released on May 17, 2016, too late to be included in the Draft TAR.

The agencies assessed a range of fuel price scenarios included in the AEO2015’s reference case, as well as its high fuel price scenario and low fuel price scenario. The agencies also assessed the three corresponding vehicle fleet mix and production volumes associated with each fuel prices scenario. See Table ES-1 of the Draft TAR. The agencies show that these three fuel price scenarios lead to differing projections about the auto industry’s achieved CAFE and GHG targets by MY2025, of 47.7 mpg/169 grams/mile (g/mi) to 46.3/175 g/mi to 45.7/178 g/mi under the high, reference, and low fuel price scenarios, respectively.

Additional EPA Response:

EPA further assessed the costs of meeting those fleet-wide standards and the associated projected technology penetrations (see Tables 12.48, 12.49, and 12.50 of the Draft TAR). As shown, each of the fuel price scenarios resulted in average per-vehicle costs and projected technology penetrations that show cost-effective pathways to compliance with the MY2025 standards, largely through production of advanced gasoline vehicles.

13. I am concerned that there is very little analysis of consumer acceptance in the Draft TAR. What is your plan to address this issue in the limited time remaining? How are you going to ensure the affordability of these vehicles for the American consumer?

Joint Response

Chapter 6 of the Draft TAR assesses consumer acceptance of the vehicle technologies expected to be used to meet the MY2022-2025 standards, and finds that to date consumer response to vehicles subject to the standards is positive. Many issues related to affordability were assessed, including effects on low-income households, effects on the used vehicle market, effects on access to credits, and the effects on low-priced cars. That chapter also reflects an exhaustive search of available literature on the issue. As the Draft TAR concludes, while it is challenging to separate the effects of the standards from other market changes, if the standards have affected vehicle affordability, those effects do not appear to have been large enough to be obvious in our considerations of the data.

Additional EPA Response:

There were many public comments on issues of consumers and vehicle affordability from automakers, dealers, consumer groups, environmental NGOs, and others that we carefully assessed and that helped inform our Proposed Determination. EPA has responded to these public comments as part of its Proposed Determination.

Additional NHTSA Response

NHTSA intends to include a discussion and analysis of affordability issues in its upcoming NPRM.

14. During the hearing, many noted how footprint-based standards address shifts in vehicle size and therefore implicitly address manufacturer concerns regarding customers' changing vehicle size preferences. Do footprint-based standards address customer powertrain selection within the same vehicle? Do footprint-based standards address market shifts from cars to similarly sized crossover vehicles that must meet the same standards?

Joint Response

The standards accommodate consumer choice – consumers can still choose vehicles with bigger engines, or choose crossover vehicles rather than cars. As consumers make those choices, it is up to manufacturers to choose how to meet the standards. If some vehicles sold fall short of their targets, manufacturers must decide what other vehicles to sell in order to meet their overall average standard. That has always been the nature of the corporate average fuel economy and GHG vehicle standards.

With regard to consumer powertrain selection within a given vehicle footprint, a manufacturer is not required to meet the exact footprint-based CO₂/fuel economy target of any particular vehicle; rather, the manufacturer meets the standards on a fleet-wide average basis. Thus, within a given footprint, a manufacturer may choose to produce vehicles that are higher or lower than the given footprint-based target, and the program provides a wide range of

flexibilities to achieve compliance, such as averaging and opportunities for credit transfers and credit trading. Specifically, with respect to customer power train selection within the same vehicle, please see the response to Question 1 above, which includes a detailed description of the program elements that provide the automotive company with significant flexibilities for how they can comply with the program, as ultimately it is up to each individual automotive company to decide what powertrain options to offer for sale for any given vehicle. It is important to note that when consumers shift from cars to similarly sized crossover vehicles, that shift may change manufacturers' overall GHG/CAFE standards. NHTSA and EPA have separate standards for cars and trucks, and many crossover vehicles (e.g., especially four-wheel drive crossovers) are defined as trucks, and therefore subject to more lenient targets than similarly-sized cars.

15. **[Question to EPA only]** During the investigation of VW's emissions "cheat devices," EPA stated that the defeat device results in on-road emissions of nitrogen oxides (NOx) that are 10 to 40 times higher than permitted by regulation. Please provide a detailed explanation or description of any assessments EPA has conducted to evaluate the real-world effects of these emissions. In addition, please respond to the following question:

- What is the difference between the expected U.S. domestic NOx emissions from these vehicles without the defeat device and with the device (i.e., how many more emissions were found to have been emitted from these cars than were expected without the device). Please provide all documentation regarding EPA's analyses.

EPA Response

EPA cannot comment at this time due to the ongoing investigation.

16. Given the amount of subjective modeling in the TAR, should fines and penalties be adjusted where TAR assumptions don't materialize?

Joint Response:

There are many aspects of our modeling that are necessarily based on projections, for example, projections of future fuel prices to assess potential fuel savings and projections of the future vehicle fleet mix to assess potential fleet-wide CO₂ targets. While these projections are important for assessing potential future impacts of the standards, it is important to remember that the standards are performance-based, so manufacturers may choose which technology path makes the most sense for their compliance strategies. More basically, a manufacturer's actual standards are based on the mix of vehicles they produce in a given model year. Thus, whether or not the projections made in the Draft TAR materialize, manufacturers' compliance is based on their actual vehicle production. The most recent EPA Manufacturer Performance Report for MY 2015 documents that manufacturers have been exceeding the GHG standards for four years in a row.

Additional NHTSA Response

NHTSA does not have authority to amend the civil penalty amount beyond the inflation adjustment mandated by the 2015 Inflation Adjustment Act, except as provided in 49 U.S.C. 32912(c). NHTSA's statutory authority requires the Agency to set CAFE standards at the maximum feasible level, and to amend them if they are not maximum feasible. These decisions are informed by information that manufacturers provide to the Agency.

17. What additional steps do you plan to take to further align the varying standards?

EPA Response

Please see EPA response to Representative Guthrie below.

[NHTSA Burgess Q14] What additional steps does NHTSA plan to take to further align with varying standards?

NHTSA Response

There is a petition for rulemaking currently before the Agency asking it to consider granting additional CAFE credits by regulation, which NHTSA is actively considering. The upcoming rulemaking to set CAFE standards for MYs 2022 and beyond will also consider issues such as programmatic flexibilities and what levels of stringency would be maximum feasible for those model years

The Honorable John Shimkus

1. You noted in your testimony that innovation is resulting in over 100 Car, SUV, and Pickup versions on the market today that already meet 2020 or later standards. I'd like to see that list of 100 vehicles and I'd like to know three things:
 - A. What percentage of vehicle sales do those 100 cars, SUVs and Trucks represent?
 - B. What is the price differential versus other similarly situated cars, SUVs or trucks?
 - C. How many of the 100 also meet the EPA and NHTSA requirements by 2025?

EPA Response

As presented in Appendix C, Table 3.1 of the Technical Support Document associated with the Proposed Determination (posted at this site: <https://www.epa.gov/sites/production/files/2016->

[11/documents/420r16021.pdf](#)), EPA's analysis indicated that there are about 150 model year 2016 vehicle versions (out of a total of 1,328 versions) that already meet their respective footprint-based CO₂ target for model year 2020, which represents about 17 percent of total production; almost 60 versions already meet the 2025 targets, which represent over 3 percent of production. Although final data for model year 2017 are not yet available, it appears that this trend is continuing. EPA does not have pricing information for vehicle models.

NHTSA Response

NHTSA does not track this information because the CAFE standards are average standards. Although CAFE standards are defined in terms of footprint-based functions under which each vehicle version has a target, no single vehicle is required to meet its target, because CAFE standards apply to the average fuel economy of manufacturers' fleets of passenger cars and light trucks. Thus, specific individual vehicles do not meet or fail to meet CAFE standards.

2. Can you please explain how EPA and NHTSA considered how the increased costs of future fuel economy/GHG standards may conflict with a consumer's ability to afford various life- saving vehicle safety technologies that auto manufacturers are currently adding to vehicles? Effectively, when consumers have limited funds to purchase a new car, is EPA and NHTSA presuming that the emissions and fuel economy technology and compliance obligations take priority over other safety technologies? What other consumer needs do the agencies believe should not take priority over fuel economy (e.g. utility)?

Joint Response

EPA and NHTSA believe that the implication that consumers will have to choose between improved fuel economy and safety is a false choice, as there's no reason under our standards that consumers can't continue to choose the vehicle that has the utility, performance, safety, and other attributes that meet their needs. As explained in the Draft TAR, we have not found evidence to date that consumers have needed to compromise on any needs while reducing fuel consumption and greenhouse gas emissions. With regard to how we accounted for safety regulations in our Draft TAR analysis, the agencies assumed as part of the reference case that all currently required safety equipment is included in the vehicles.

Additional NHTSA Response Fuel economy and safety can continue to improve concurrently. New vehicles frequently have more safety features *and* get better fuel economy than prior models, and may also have more of other consumer-desired attributes like towing, hauling, or acceleration. Manufacturers strategize on pricing as they decide how to compete in different market segments. NHTSA's modeling tries to account for manufacturers' interests in maintaining or improving consumer-desired attributes like towing, hauling, and acceleration. We also account for the mass gains likely to result from compliance with upcoming safety standards in our assessment of fuel economy benefits. We are carefully considering TAR

comments on consumer needs and will respond to those comments as part of the upcoming NPRM.

The Honorable H. Morgan Griffith

1. Due to EPA's proposed requirements, truck trailer manufacturers will have to add aerodynamic equipment, with the added weight displacing freight. As trucking companies still must observe weight laws, it is only logical more tractor trailers will be needed to carry the same amount of freight.
 - A. Won't more tractor trailers on the road will worsen air quality and safety?
 - B. Is it true that NHTSA estimates that an additional 2.7 people will die annually in road deaths as a result of these regulations?

EPA Response

For clarity, this question refers to the Heavy-Duty Phase 2 GHG standards that EPA and NHTSA recently finalized (81 FR 73478, October 25, 2016). That rule is independent of the light-duty vehicle standards assessed in the Draft TAR.

In our analyses for that rule, the agencies recognized that the aerodynamic devices that we believe may be adopted to meet the Heavy-Duty Phase 2 GHG trailer standards would inherently add weight to trailers. We also recognized that for that fraction of trips for which trailer operators load trailers to the maximum legal weight, the relatively small weight of the devices could result in an increase in numbers of trips. For that analysis, we estimate that trailers “weigh out” in that way about one third of overall tractor-trailer trips, and that they “cube out” (that is, reach the maximum volume of the trailer before the weight limit is reached) for the remainder of trips.

. At the same time, the rule provides an incentive to reduce the overall weight of their trailers, and the potential positive safety implications of weight reduction efforts could partially or fully offset safety concerns from added weight of aerodynamic devices. In fact, weight reduction incentivized through the Phase 2 trailer program could produce net benefits for both safety and air quality in the longer term due to the potentially greater amount of cargo that could be carried on each and the need for *fewer* trucks on the road.

NHTSA Response

Response to 1.A:

The Phase 2 medium- and heavy-duty fuel efficiency rulemaking assumes that trailer manufacturers will apply aerodynamic devices to their trailers, increasing the aerodynamic efficiency of the trailer, thereby using less fuel. Additionally, the rule considers that some

trailer manufacturers will incorporate lightweight components (e.g., aluminum landing gears and coupler assemblies) into their trailers. The Agencies examined this relationship in the Phase 2 medium- and heavy-duty rulemaking and concluded that the additional weight from aerodynamic fittings could be partially or fully offset by lightweighting. Therefore, both agencies agree that adding aerodynamic components will not necessarily lead to more tractor trailers on the roads.

Response to 1.B

No. The Agencies considered and analyzed the added weight from installing aerodynamic devices on trailers. A commenter to the proposal included an estimate of projected additional fatalities due to increased truck vehicle miles travelled (VMT) and the Agencies noted discrepancies in the commenter's assumptions. The Agencies concluded that integrating lightweight technologies into trailers, which is a means of compliance, could partially or fully offset the safety concerns stemming from the added weight of aerodynamic devices.

2. **[Question to EPA only]** At the Committee hearing, you justified EPA's regulation of trailers as a "self-propelled vehicle" (42 USC 7521(b)) by stating "without a trailer, a truck is not transporting goods. And so we see the trailer as an integral part of the vehicle that is covered in the Clean Air Act." Currently, the truck can't drive itself. So does the EPA take the position under the Clean Air Act that it has the authority to regulate the height, weight, and size of the driver?
3. **[Question to EPA only]** I hope you laughed at the above question. However, isn't that the same reasoning that you used as the basis for regulating trailers?

EPA Response

EPA's rationale for establishing greenhouse gas standards for trailers is more inclusive than the hearing format allowed; we are glad to provide a fuller response here. EPA's basic logic chain is as follows:

- A tractor-trailer together is unquestionably a "motor vehicle," as we explain in detail in the Heavy-Duty Phase 2 final rule. Therefore, EPA is authorized to promulgate emission standards for pollutants emitted by that motor vehicle.
- The Clean Air Act also contemplates emission standards from discrete segments of motor vehicles. See, e.g. 42 USC section 7521 (a)(6) (standards for onboard vapor recovery systems on "new light-duty vehicles"). A trailer is such a discrete component of the tractor-trailer.
- Trailer manufacturers can be required to certify (i.e. demonstrate) compliance with these standards because they meet the definition of "manufacturer" in 42 USC section 7550(1). That definition contemplates that motor vehicles can have more than one manufacturer.
- In fact, EPA's motor vehicle emission standard regulations have long provided 'delegated

assembly' provisions, where a motor vehicle is assembled by different, unrelated entities in discrete segments. These provisions (which antedate the Phase 2 regulations by decades) provide when and how certification responsibilities are allocated when a motor vehicle has multiple, unrelated manufacturers. The requirement in the phase 2 rule that trailer manufacturers certify compliance with the trailer standards is an application of these longstanding rules.

Please see 81 FR at 73512-517 (Oct. 25, 2016) for a fuller explanation.

The Honorable Brett Guthrie

Following a previous hearing on related issues, I submitted questions for the record regarding the "lack of harmonization" between the NHTSA and EPA fuel economy programs. Based on feedback I've gotten from the field, my takeaway is that we don't have "one" program in practice. The manufacturers are still regulated by two federal agencies under two programs that do not appear to be fully harmonized.

However, the Administration said in its Regulatory Announcement of August 2012 regarding the 2017-2025 requirements: "Continuing the National Program ensures that auto manufacturers can build a single fleet of U.S. vehicles that satisfy requirements of both federal programs as well as California's program." In several of the responses to my previous questions for the record, NHTSA stated that "manufacturers may build a single fleet to meet all requirements." And, "Because of the different statutory authorities, the [NHTSA and EPA] programs differ in some ways, but are structured to be harmonized such that manufacturers may build a single fleet of vehicles to meet all requirements."

1. Is there a situation where a manufacturer could meet the NHTSA requirement and not meet the EPA's requirement or vice versa?
2. Is it not automatic or "ensured" that one fleet of vehicles will comply with both programs- as the Regulatory Announcement stated?
3. Is my understanding correct that the two programs claim about the same fuel savings through 2021, NHTSA at 65.3 billion gallons and EPA at 65.6 billion gallons?
4. If the answer to number three is yes, both programs claim about the same fuel savings, then what could be the public policy benefit of a manufacturer being able to build a fleet that meets one agency's requirements but still having to pay a fine to the other program for the same fleet, as I understand can happen in practice?
5. Are your agencies aware of legislative provisions that would help correct the harmonization inconsistencies?

6. Will your agencies commit to working with Congress to enact these changes?

Joint Response

The National Program is possible because of the close relationship between reducing CO₂ tailpipe emissions and improving fuel economy. The more fuel efficient a vehicle is, the less fuel it burns to travel a given distance; the less fuel it burns, the less CO₂ is emitted in traveling that distance. Therefore, the same sets of technologies that improve fuel efficiency also at the same time reduce CO₂ emissions (note there are some technologies that reduce GHG emissions but do not improve fuel efficiency, for example, reduction of air conditioning refrigerant emissions). In this way, the National Program allows auto manufacturers to use a common set of technologies to simultaneously address both related issues of reducing CO₂ emissions and improving fuel efficiency. (See 75 FR 25327, May 7, 2010).

Going back to the first time the agencies established standards for the 2012-2016 model years, EPA and NHTSA were clear that there were some important differences in the statutory authorities (see 75 FR 25330, May 7, 2010), and that the stringency of the respective standards was in fact established to account for differences in air conditioning improvements. The agencies have worked to establish a national program subject to the differences in statutory authorities.

Additional EPA Response

One area where the statutory authorities are different between the agencies relates to potential penalties for non-compliance. The Clean Air Act allows EPA considerable discretion in assessing penalties, and, in the event of a compliance action arising out of the same facts and circumstances, EPA could consider CAFE fines when determining appropriate remedies for the EPA case.

EPA would be happy to assist in providing technical support to potential legislative provisions related to harmonization, should Congress request it.

Additional NHTSA Response

Response to 1:

We understand that because EPA's program contains more flexibilities than the CAFE program, some manufacturers find it easier to comply with EPA's standards in certain model years. However, under the joint National program, a manufacturer may build a fleet of vehicles that complies with both standards. The manufacturer has the flexibility to choose how to comply.

Response to 2:

It is up to manufacturers how they choose to comply. If a manufacturer relies heavily on EPA-only flexibilities for GHG compliance, it may be more difficult to meet NHTSA's CAFE standards, but that does not absolve the manufacturer of its legal requirement to comply with the CAFE standards or pay civil penalties.

Response to 3:

In the 2012 Final Rule, considering manufacturers' ability to employ certain flexibilities, NHTSA estimated total fuel savings between model years 2017 – 2021, relative to the continuation of the MY 2016 standard, of about 65.3 billion gallons under the 2008 baseline, and about 66.5 billion gallons under the 2010 baseline. See Table I-9 of the Final Rule (77 Fed. Reg. at 62657, Oct. 15, 2012).

Response to 4:

NHTSA's obligation is to set standards that it believes, based on analysis, are maximum feasible, following the requirements of our statute.

Response to 5:

NHTSA is aware that proposals have been drafted.

Response to 6:

The Agency is available to provide technical assistance on amendments to the CAFE program statutes.